

ABSTRACT OF THE DISCLOSURE

A method for single molecule identification of a target DNA molecule in a random coil state having the following steps: a) attaching an

- 5 optically distinguishable material to a DNA sequence recognition unit; b) hybridizing the DNA sequence recognition unit to the target DNA molecule in a random coil state to form a hybridized DNA complex in a random coil state; c) passing the hybridized DNA complex in a random coil state from a reservoir in a microfluidic device through a narrow channel to cause an acceleration of flow
- 10 through the channel, thereby causing the hybridized DNA complex to extend into a substantially linear configuration; and d) detecting the optically distinguishable material in a sequential manner along the substantially linear hybridized DNA complex, thereby identifying the target DNA molecule.